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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/977,158

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Richard Lai

12-1166

3901

27572

7590

01/08/2004

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EXAMINER

MACARTHUR, SYLVIA

ART UNIT

PAPER NUMBER

1763

DATE MAILED: 01/08/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/977,158

Applicant(s)

LAI ET AL.

Examiner

Sylvia R MacArthur

Art Unit

1763

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 30 October 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-11 and 14-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 11 and 14-20 is/are allowed.
- 6) ☒ Claim(s) 1,2 and 4-10 is/are rejected.
- 7) ☒ Claim(s) 3 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 October 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_ 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 4, and 9 are rejected under 35 U.S.C. 102(b) as being anticipated by Shimizu et al (US 5,976,312).

Regarding claim 1: Shimizu et al teaches a semiconductor processing apparatus for simultaneous thinning the backside surfaces of a plurality of wafers comprised of a semiconductor material, comprising:

A fixture (boat means) 9 having a plurality of horizontally oriented receptacles (mounting portion 14) and an etchant solution capable of isotropically removing a layer of semiconductor material from the backside surface of the plurality of wafers. The loaded fixture is immersed into the etchant solution for sufficient period of time a layer of semiconductor material is removed from the backside surface of the plurality of semiconductor wafers to form a plurality of thinned semiconductor wafers.

Regarding claim 4: Col. 2 lines 55-59 discusses that a motor means 2 for applying a rotational force to the boat means 9.

Regarding claim 9: The semiconductor devices manufactured by the apparatus of Shimizu are inherently capable of being incorporated into the devices discussed.

*Claim Rejections - 35 USC § 103*

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 2, 7, 8, and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimizu et al in view of Tran et al (US 6,187, 515).

The teachings of Shimizu et al were discussed above.

Regarding claim 2: Shimizu et al fails to teach the composition of the etchant solution mixture.

Tran teaches an etchant solution comprised of a mixture of acetic acid, hydrogen bromide, potassium dichromate, and water in col. 6 lines 40-56. Tran further teaches that the solution has a volume ratio of 4.5 parts water: 3 parts hydrobromic acid: 1 part acetic acid, and 66 g of potassium dichromate: 100 ml: 300 ml solution.

The motivation to provide an etchant solution comprising the mixture state above is that it is a suitable etchant solution known by those of ordinary skill in the art to etch wafers made of III-V semiconductor materials, see col. 9 lines 13-18.

Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to utilize an etchant solution in the apparatus of Shimizu et al with the composition suggested by Tran.

Regarding claim 7: Shimizu et al fails to teach the temperature of the etchant solution.

Tran teaches the etchant solution is maintained at a temperature between 40 to 60 deg. Celsius, see col. 6 lines 54-56.

Temperature is an art recognized optimizable operating parameter.

One of ordinary skill in the art at the time of the claimed invention would have found it obvious at the time of the claimed invention to maintain the temperature within a range that would optimize the chemical and physical properties of the chemical solution to yield the desired etching process result.

Regarding claim 8: Shimizu et al fails to teach the composition of the semiconductor material.

Col. 5 line 56 of Tran teaches that the wafer comprises InP.

Indium phosphide is an art recognized semiconductor material well known in the art to provide advantageous results in manufacturing many types of reflective mirrors, fiber optical devices, and optical integrated circuits as suggested by Tran in col. 5 lines 8-17.

Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to utilize InP as a material of construction for semiconductor substrates.

Regarding claim 10: Shimizu et al fails to teach the final thickness of the semiconductor wafer.

Tran teaches the final thickness of the substrate is between 135 and 175 microns as illustrated in Fig. 5a. Tran notes the process steps are performed to provide the substrate with a desired thickness. The thickness of finished substrate is a well known optimizable parameter.

One of ordinary skill in the art at the time of the claimed invention would have found it obvious to provide the substrate of Shimizu with a desired thickness as Tran teaches.

5. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shimizu et al in view of Lee (US 6,235,147).

The teachings of Shimizu et al were discussed above.

Shimizu et al fails to teach a circulation line.

Col. 7 lines 20-29 of Lee discusses that a circulation line 70 is provided.

The motivation to provide a circulation line in the apparatus of Shimizu is the circulation provides for the reuse of a process fluid and allows for the efficient use of a process fluid.

Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide a circulation line as the circulation apparatus in the apparatus of Shimizu.

6. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shimizu et al in view of Mendes (US 4,350,553).

The teachings of Shimizu et al were discussed above.

Shimizu et al fails to discuss a temperature adjusting apparatus.

Mendes teaches etching semiconductor wafers in an acid bath. A temperature regulator 98 for the acid bath apparatus.

Mendes teaches that acid bath are highly volatile and temperature control is paramount to ensure safety, see col. 5 lines 1-13.

Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide a temperature adjustment apparatus in the apparatus of Shimizu et al to increase the safety in the highly volatile chemical environment.

***Allowable Subject Matter***

7. Claim 3 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

8. Claims 11 and 14-20 are allowed.

9. The following is a statement of reasons for the indication of allowable subject matter:

The prior art of record fails to teach or fairly suggest an apparatus or method with the composition of claims 3 and 11.

***Response to Arguments***

10. Applicant's arguments with respect to claims 1-11 and 14-20 have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

11. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period


will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.


12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sylvia R MacArthur whose telephone number is 703-306-5690. The examiner can normally be reached on M-F during the core hours of 8 a.m. and 2 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory L. Mills can be reached on 703-308-1633. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Sylvia R MacArthur  
Patent Examiner  
Art Unit 1763

  
December 29, 2003

  
GREGORY MILLS  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 1700